POTENTIAL STUDY OF BERA LAKE WATER QUALITY FOR ALTERNATIVE SOURCE OF WATER SUPPLY

NUR LYANA ADIBAH BINTI MUSHIWAN

B. ENG(HONS.) CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

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I/We* hereby declare that I/We* have checked this thesis/project* and in my/our* opinion, this thesis/project* is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

_____

(Supervisor's Signature)

Full Name :

Position :

Date :

_____

(Co-supervisor's Signature)

Full Name :

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_____

(Student's Signature)

Full Name : NUR LYANA ADIBAH BINTI HJ MUSHIWAN

ID Number : AA14187

Date : 25 JUNE 2018

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NUR LYANA ADIBAH BINTI MUSHIWAN

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ABSTRAK

Kajian ini memberi tumpuan dalam menentukan potensi kualiti air untuk alternatif sumber air. Kualiti air adalah penting sebagai sumber untuk menggambarkan sifat fizikal, biologikal dan kimia untuk mengelaskan kepada setiap kelas. Kajian ini dijalankan berdasarkan sifat parameter fizikal, biologikal, dan kimia dari Tasik Bera semasa bulan Febuari dan April 2018. Parameter fizikal adalah suhu dan jumah pepejal gantung. Kemudian, parameter kimia adalah nilai pH, bubaran oksigen (DO), permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), nitrogen ammonia, fosforus, logam berat terpilih seperti zink, tembaga, kadmium, dan plumbum. Parameter biologikal, adalah jumlah koliform dan Escherichia coli. Air di klasifikasi berdasarkan indeks kualiti air (WQI) dan indeks kualiti air negara untuk Malaysia (NWQS). Merujuk kepada standard WQI, pengkelasan kualiti air berdasarkan jenis pengkelasan. Selepas selesai ujian makmal, dua stesen di Tasik Bera boleh di klasifikasikan kepada kelas dua. Stesen 1 dengan bacaan 79.33 adalah kelas 2, jika mahu di jadikan sumber air perlu menjalani rawatan konvensional. Stesen 2 dengan bacaan 79.24 juga berada dalam kelas 2. Ia juga perlu menjalani rawatan konvensionaljika mahu di jadikan sebagai sumber air. Secara kesimpulannya, mengenal pasti kualiti air adalah penting untuk membezakan penyesuaian penggunaan air.

ABSTRACT

This study concentrated on deciding potential of Bera Lake water quality for alternative source of water supply. Water quality is an important reference for describing the physical, chemical, and biological properties of water classification into each class. A study was conducted on physical, chemical, and biological parameter of Bera Lake on 2018 that contain water bodies at two stations with two sampling in two months of February and April 2018. Physical parameters were temperature and total suspended solids. Then, chemical parameters were pH value, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), ammonia nitrogen, phosphorus and selected heavy metals such as zinc, copper, cadmium and lead. For biological parameter were Total Coliform and E. Coli. The water was classified based on Water Quality Index (WQI) and National Water Quality for Malaysia (NWQS). Based on WQI standard, classifications of water quality were based on type of class. After accomplishment the laboratory test, two stations in Bera Lake can being determined classified into class 2. Station 1 with 79.33 is for class 2, if use for water supply need conventional treatment. Station 2 with 79.24 also in class 2. If want to being as water supply the conventional treatment were needed. Overall, identifying water quality is important for differentiate suitable purpose of water body. It is very important for conserving and preserve source of surface water for water supply purposes in a future.

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LIST OF SYMBOLS

^{o}C	Temperature
mg/L	Milligram per liter
MPN	Most portable number

LIST OF ABBREVIATIONS

BOD	Biochemical oxygen demand
COD	Chemical oxygen demand
Cd	Cadmium
Cu	Copper
DO	Dissolved oxygen
NWQS	National Water Quality Standard
Pb	Lead
TSS	Toal Suspended Solid
UMP	Universiti Malaysia Pahang
WHO	World Health Organization
WQI	Water Quality Index
Zn	Zinc

CHAPTER 1

INTRODUCTION

1.1 Background

Water connects every aspect of life. It is one of important substances on earth. Clean water is essential for life, but most people in the developed world do not think much about the water. They use water for drinking, food preparation, and sanitation. Millions of people die each year, most of them children, from largely preventable diseases caused by a lack of access to clean water and proper sanitation. Access to safe water and sanitation can quickly turn problems into potential – unlocking education, work opportunities, and improved health for women, children and families across the world. Every life thing must have water to survive. No water no life in earth. Every day, 2 million tons of sewage and industrial and agricultural waste are discharged into the world's water (INSTITUTE, 2010), the equivalent of the weight of the entire human population of 6.8 billion people. Worldwide, infectious diseases such as waterborne diseases are the number one killer of children under five years old and more people die from unsafe water annually than from all forms of violence, including war (INSTITUTE, 2010). In some regions, more than 50% of native freshwater fish species are at risk of extinction, and nearly one-third of the world's amphibians are at risk of extinction (Peter B Moyle, 2010). In Earth only 3 % of Earth's is fresh water and rest of 97 % of the water consist of salt water (contributors, 2018). However the fresh water contain high demand rather than salt water.

There are many catchment area became as water resources on earth. The common catchment area are instance stream, pond, river or freshwater wetland. These catchment area basic function for agricultural use, industrial use and for generation of different types of energy like hydro electric energy. However, it is important to know the quality of water since it became from limited volume.

In Pahang, there are many issues of water quality that occured because of human activity (bauxite mining), agricultural and travel activities. There is a natural freshwater Bera Lake. It is RAMSAR site since 1994. However on past few years Bera Lake became polluted because of agricultural activities and illegal logging. 1,000 hectares of RAMSAR's permanent forest reserve in Tasik Bera, Pahang, changed status and approved for logging activity (Malaysia, 2016). Bera Lake is the water resources to Semelai community. The polluted of water became dangerous to community area.

1.2 Problem statement

Nowadays there are several problem of water quality occurred in an international area. For example on 2017, Pakistan drinking water quality is being deteriorated day by day, China had unusable drinking without treatment, Lebanese had a brown-colored area in the sea, Lake St. Clair nearly a trillion gallons of partially treated storm sewer overflow, storm water runoff mixed with sewage. From this problem occurred water can be polluted easily. A healthy water quality is good for everybody and good for future also. Malaysia, catchment area as water resources to locals but today many catchment area being polluted. There are 43 river in Malaysia being polluted (Bernama, 2016). Suspended solid pollution from land development activities. For example Langat River area. Langat River water became polluted to groundwater and soil quality because of agricultural and industrial activities. The other is Tasik Titiwangsa, got water pollution because of human activities.

In Pahang, there is a catchment area such as Lake Bera. As we know Lake Bera is the largest natural lake in Peninsular Malaysia and designated as first RAMSAR site. Even it is RAMSAR site it is water supply or water resources to Semelai community or Orang Asli Semelai. They used for daily used. Water pollution occur because of land development for establishment of oil palm, rubber tree plantations and illegal logging that affected wetlands and open waters. It is also affected to increase the sedimentation rate.

1.3 Objectives

The main objectives of this study are :

i. To identify the behavior of water quality parameter based on special variation of the study area.
ii. To identify or disclosed the suitability of the lake water quality for alternative source of water supply.

1.4 Scope of study

Bera Lake is located in southwest Pahang, Malaysia in the saddle of the main and eastern mountain ranges of Peninsular Malaysia, extending 35 km long and 20 km wide, drain into the Pahang River. Bera Lake is the largest neutral freshwater lake system. The location of Bera Lake located at water crisis problem however it is RAMSAR site. Pollution of water occured because of land development by FELDA and illegal logging.

Sampling station in this research area was located at various points according to their different depth, current flow, and surrounding activities around the lake. Besides, sampling points also based on water intake criteria. Water intake criteria consists of best available water quality, far from strong current, quantity of water demanded can be achieved at very low water flow rate, easy accessible and possess adequate space. The sample from each sampling point will be taken once since lake is not a stream flow that may show frequent changes.

The study includes physical, chemical, and biological characteristics parameters. The physical parameter consists of temperature, conductivity and total suspended solid test. Whereas chemical parameter consists of pH test, dissolve oxygen, biochemical oxygen demand, chemical oxygen demand, ammoniacal nitrogen, phosphorus, sulphate, selected test for heavy metal presence. Biological parameter consists of Absence-Presence Test, E.Coli and Total Coliforn Presence Test.

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